

***Remarks***

Upon entry of the foregoing amendment, claims 1-8 are pending in the application, with claims 1 and 5 being the independent claims. Claims 1 and 5 are sought to be amended to add an "and" that was inadvertently omitted from each claim, and to define variables  $T_S$ ,  $m$ , and  $k$ , as required by the Examiner. These changes are believed to introduce no new matter, and their entry is respectfully requested.

The title and paragraph [0001] of the specification are amended as requested by the Examiner. In addition, various paragraphs of the specification are amended to correct minor typographical errors in the equations. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

***Rejections Under 35 U.S.C. § 112***

The Office Action states in paragraph 1 on page 2, that claims 1-8 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Specifically, it is stated that in claims 1 and 5, the quantities " $k$ ,  $m$  and  $T_S$ " fail to be defined. In response to this rejection, independent claims 1 and 5 are amended to define variables  $T_S$ ,  $m$ , and  $k$ , as described in paragraphs [0107]-[0109] of the specification. For at least this reason, independent claims 1 and 5, and the claims depending therefrom (claims 2-4 and 6-8, respectively) are allowable. Thus, Applicant respectfully requests that the rejection of claims 1-8 be reconsidered and withdrawn.

***Objections to the Specification***

The Office Action states in paragraph 3 of page 2 that the title of the invention is not descriptive and that a new title is required. In response to this objection, the title is amended to more clearly correspond to the claims. Applicant respectfully requests that the objection to the title be reconsidered and withdrawn.

The Examiner also had some questions about the derivations of various equations in paragraphs [0107]-[0109] of the specification. The following paragraphs provide explanations of the derivations of Equations (8-4) and (8-5).

Equation (8-3) is shown in paragraph [0107] as follows:

$$u(t - iT_f) = 0, \text{ where } i = (k+1), (k+2), \dots, (k+R-1) \quad (8-3)$$

If, for example,  $(k+1)$  is substituted for  $i$ :

$$u(t - (k+1)T_f) = u(t - (kT_f + T_f)) = u(t - kT_f - T_f) = 0 \quad (\text{Substitution 1})$$

If, then, for example,  $(k+2)$  is substituted for  $i$ :

$$u(t - (k+2)T_f) = u(t - (kT_f + 2T_f)) = u(t - kT_f - 2T_f) = 0 \quad (\text{Substitution 2})$$

In continuing substitutions for  $i$ , it can be seen that:

$$u(t - iT_f) = u(t - kT_f - iT_f) = 0 \quad (\text{Substitution 3})$$

where  $i$  is an incrementing variable. If  $t - kT_f$  is then substituted with  $mT_S - kT_f$ , as directed in paragraph [0108], this is the equivalent of setting  $t$  equal to  $mT_S$ . If in Example 3,  $t$  is set equal to  $mT_S$ , then the equation in Example 3 becomes:

$$u(t - iT_f) = u(t - kT_f - iT_f) = u(mT_S - kT_f - iT_f) = 0 \quad (\text{Substitution 4})$$

which is what is shown in Equation (8-4). (Note that the capital "U" in Equation (8-4) has been amended to be lower-case to be consistent with the rest of the specification.)

The first line of Equation (8-5) does not directly come from Equation (8-4), but comes from assigning  $t = mT_s$ , as was done to derive Equation (8-4). If  $mT_s$  is substituted for  $t$  in Equation (8-2), then:

$$y(t) = \sum_{i=0}^{N-1} b_i u(t - iT_f) = \sum_{i=0}^{N-1} b_i u(mT_s - iT_f)$$

which is shown as the first line of Equation (8-5). (Note that the " $N = 1$ " in Equation (8-5) was a typographical error and has been amended to read -- $N - 1$ --.)

The second line of Equation (8-5) can be shown by way of the example described starting at paragraph [0112] of the specification. The following paragraphs will go through a portion of this example. The example uses the following parameters:

$N = 3$  and  $R = 2$  (from paragraph [0112]);

$R = T_s / T_f \rightarrow 2 = T_s / T_f \rightarrow T_s = 2T_f$  (from Equation (8-1)); and

$u(t - kT_f) = u(mT_s)$  (from paragraph [0014])  $\rightarrow t - kT_f = mT_s$ .

Equation (9-1) shows the result of allowing  $N = 3$  in Equation (8-2):

$$y(t) = b_0 u(t) + b_1 u(t - T_f) + b_2 u(t - 2T_f) \quad (9-1)$$

Equation (8-3) states:  $u(t - iT_f) = 0$ , where  $i = (k+1), (k+2), \dots, (k+R-1)$ . Here,  $R = 2$ , so the Equation (8-3) equals 0 when  $i = (k+1)$ . For the values of  $i = (k+1)$  and  $(k+2)$ :

$i = (k+1) \rightarrow u(t - (k+1)T_f) = u(t - kT_f - T_f) = 0$  (from Equation (9-2)); and

$i = (k+2) \rightarrow u(t - (k+2)T_f) = u(t - kT_f - 2T_f)$

$= u(mT_s - T_s)$  (using the substitutions above)

$= u(mT_s - T_s) = u((m-1)T_s)$  (from Eq.(9-3)).

When  $k=0$ , for example:

$$u(t-T_f) = 0;$$

$$u(t-2T_f) = u(mT_s - T_s); \text{ and}$$

$$t = mT_s \rightarrow u(t) = u(mT_s).$$

Plugging these values into Equation (9-1) provides:

$$y(t) = b_0u(t) + b_1u(t-T_f) + b_2u(t-2T_f) \quad (9-1)$$

$$= b_0u(mT_s) + 0 + b_2u(mT_s - T_s)$$

$$= b_0u(mT_s) + b_2u(mT_s - T_s) \quad (\text{Result A})$$

If the values  $N = 3$ ,  $R = 2$ , and  $k = 0$  are plugged into the second line of Equation (8-5), then Equation (8-5) is as follows:

$$\begin{aligned} y(t) &= \sum_{i=0}^{N-1} b_i u(t - iT_f) = \sum_{i=0}^{N-1} b_i u(mT_s - iT_f) \\ &= \sum_{i=k}^{\text{ceil}[(N+1-k)/R]-1} b_{iR-k} u((m-i+k)T_s) \\ &= \sum_{i=0}^{\text{ceil}[(3+1-0)/2]-1} b_{2i-0} u((m-i+0)T_s) \\ &= \sum_{i=0}^{\text{ceil}[2]-1} b_{2i} u((m-i)T_s) \\ &= \sum_{i=0}^1 b_{2i} u((m-i)T_s) \\ &= b_0u(mT_s) + b_2u((m-1)T_s) \\ &= b_0u(mT_s) + b_2u(mT_s - T_s) \quad (\text{Result B}) \end{aligned}$$

Note that Result A from Equation (9-1) and Result B from Equation (8-5) are the same. This example shows that the second line of Equation (8-5) can be derived from the first line of Equation (8-5) (or from Equation (8-2)). The ceil function is used to ensure that the value on top of the summation symbol is an integer.

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***Conclusion***

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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